

Remarks

Applicants respectfully request reconsideration of the present application in view of the above amendment and following remarks. Claims 11, 15 and 21 have been amended, claims 26-31 have been added, and claims 1-4, 19 and 23-25 have been cancelled. Therefore, claims 5-18, 20-22 and 26-31 are pending in the present application.

Claims 1, 2, 5-12, 14, 15 and 21-25 have been rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Publication No. 2004/0035395 to Heywood et al. ("the Heywood reference"). Also, claims 3, 4, 13 and 16-20 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over the Heywood reference. Claims 1-4, 19 and 23-25 have been cancelled, therefore the rejection to these claims is moot. Applicants respectfully traverse the rejections to the remaining claims.

Claim 5 is directed to a method for fueling an internal combustion engine with a hydrocarbon fuel and a hydrogen-containing fuel gas. The method includes: a) starting the engine on a mixture of the fuel and the fuel gas wherein at least 90% of the motive energy of the engine is derived from the hydrogen-containing fuel gas; and b) progressively changing the supply ratio between the hydrocarbon fuel and the hydrogen-containing fuel gas such that, when the engine reaches an equilibrium operating temperature, an optimum fraction of the motive energy of the engine is derived from the hydrocarbon fuel and the hydrogen-containing fuel gas.

The Heywood reference does not teach or suggest starting the engine on a mixture of the fuel and the fuel gas wherein at least 90% of the motive energy of the engine is derived from the hydrogen-containing fuel gas as recited in claim 5. In general, the Heywood reference is directed to a method for increasing the octane number in a gasoline-hydrogen mixture and reducing knocking in an engine by adding hydrogen (or hydrogen rich gas) to a hydrogen-gasoline fuel mixture. See *Heywood*, ¶ 0018. In rejecting claim 5, the Examiner stated that page 2, paragraph 18 of the Heywood reference discloses that at least 90% of the motive energy of the engine is derived from the hydrogen (or hydrogen rich gas). See *Office Action*, pg. 3. However, paragraph 18 of the Heywood reference only discloses that the hydrogen (or hydrogen-rich gas) represents 10% of the energy of the hydrogen-gasoline fuel mixture. Further, the Heywood reference also discloses that the hydrogen-rich gas may represent 25% of the total fuel energy content. See *Heywood*, ¶ 0019. The Examiner has failed to provide any evidence that the Heywood reference teaches or suggests that at least 90% of the motive energy of the engine is derived from the hydrogen (or hydrogen rich gas) as set forth in claim 5.

For at least this reason, Applicants request that the rejection of claim 5 be withdrawn. As claims 6-10 depend from claim 5, these claims are also not taught or suggested by the Heywood reference for at least the same reasons set forth with respect to claim 5. Applicants request that the rejection of claims 6-10 be withdrawn.

Dependant claim 7 is also not taught or suggested by the Heywood reference.

Claim 7 states that 100% of the motive energy of the engine is derived from the hydrogen-containing fuel gas during the starting of said engine. While the Heywood reference discloses that hydrogen (or hydrogen-rich gas) represents 10% or 25% of the energy of the hydrogen-gasoline fuel mixture, nothing specifically discloses that 100% of the motive energy is derived from hydrogen (or hydrogen-rich gas) during the starting of the engine as set forth in claim 7. For this additional reason, Applicants request that the rejection of claim 7 be withdrawn.

Amended claim 11 is directed to a system for fueling an internal combustion engine with a hydrocarbon fuel and a hydrogen-containing fuel gas. The system includes a hydrocarbon fuel supply system and a hydrogen-containing fuel gas supply system. The engine is fueled at least 90% by the hydrogen-containing fuel gas at engine start-up and by an optimum fraction of hydrocarbon fuel at engine steady-state operating conditions.

For at least the same reasons set forth with respect to claim 5, Applicants submit that the Heywood reference does not teach or suggest a system including an engine that is fueled at least 90% by the hydrogen-containing fuel gas at engine start-up and by an optimum fraction of hydrocarbon fuel at engine steady-state operating conditions as recited in claim 11. Thus, Applicants request that the rejection of claim 11 be withdrawn. As claims 12-18 and 20 depend from claim 11, these claims are not taught or suggested by the Heywood reference for at least the same reason set forth with respect to claim 11. Applicants request that the rejection of claims 12-18 and 20 be withdrawn.

Dependant claim 17 is also not taught or suggested by the Heywood reference. Claim 17 states that the reformer in claim 11 includes means for combustive preheating of catalytic elements in the reformer. In the present Office Action, the Examiner failed to address the limitation in this particular claim in view of the Heywood reference. Since the Examiner has failed to provide any specific facts supporting the rejection of claim 17, Applicants submit that a prima facie case of obviousness has not been established and request that the rejection to this claim be withdrawn for this additional reason.

Amended claim 21 is directed to an internal combustion engine fueled by a hydrocarbon fuel and a hydrogen-containing fuel gas. The engine includes a hydrocarbon fuel supply system and a hydrogen-containing fuel gas supply system. The engine is fueled at least 90% by the hydrogen-containing fuel gas at engine start-up and by an optimum fraction of hydrocarbon fuel at engine steady-state operating conditions.

For at least the same reasons set forth with respect to claim 5, Applicants submit that the Heywood reference does not teach or suggest an internal combustion engine that is fueled at least 90% by the hydrogen-containing fuel gas at engine start-up and by an optimum fraction of hydrocarbon fuel at engine steady-state operating conditions as recited in claim 21. Thus, Applicants request that the rejection of claim 21 be withdrawn. As claim 22 depends from claim 21, this claim is not taught or suggested by the Heywood reference for at least the same reason set forth with respect to claim 21. Applicants request that the rejection of claim 22 be withdrawn.

New claim 26 is directed to a method for fueling an internal combustion engine with a hydrocarbon fuel and a hydrogen-containing fuel gas. The method includes: a) starting the engine on a mixture of the fuel and the fuel gas wherein at least 30% of the motive energy of the engine is derived from the hydrogen-containing fuel gas; and b) progressively changing the supply ratio between the hydrocarbon fuel and the hydrogen-containing fuel gas such that, when the engine reaches an equilibrium operating temperature, an optimum fraction of the motive energy of the engine is derived from the hydrocarbon fuel and the hydrogen-containing fuel gas. New claims 27-31 depend from claim 26 and also include features not disclosed in the references of record.

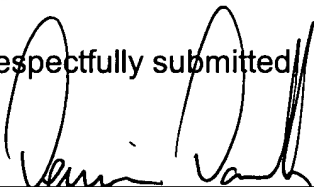
Conclusion

In light of the foregoing, Applicants submit that claims 5-18, 20-22 and 26-31 are in condition for allowance and such allowance is respectfully requested. Should the Examiner feel that any unresolved issues remain in this case, the undersigned may be contacted at the telephone number listed below to arrange for an issue resolving conference.

Applicants do not believe that any fee is due at this time. However, the Commissioner is hereby authorized to charge any fee that may have been overlooked to Deposit Account No. 10-0223.

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Respectfully submitted



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